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Geller

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(54) **EXTERNAL INDICATORS AND NOTIFICATIONS FOR VEHICLES WITH AUTONOMOUS CAPABILITIES**

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G08G 1/0962	(2006.01)
G08G 1/0967	(2006.01)

(52) **U.S. Cl.**

CPC ***B60Q 1/50*** (2013.01); ***G08G 1/0962*** (2013.01); ***G08G 1/096716*** (2013.01); ***G08G 1/096791*** (2013.01)

(58) **Field of Classification Search**

CPC B60Q 1/50; B60Q 1/2696; G05D 1/0088; G08G 1/22; G08G 1/096791; G08G 1/0962; G08G 1/096716

USPC 340/438, 457, 463, 468

See application file for complete search history.

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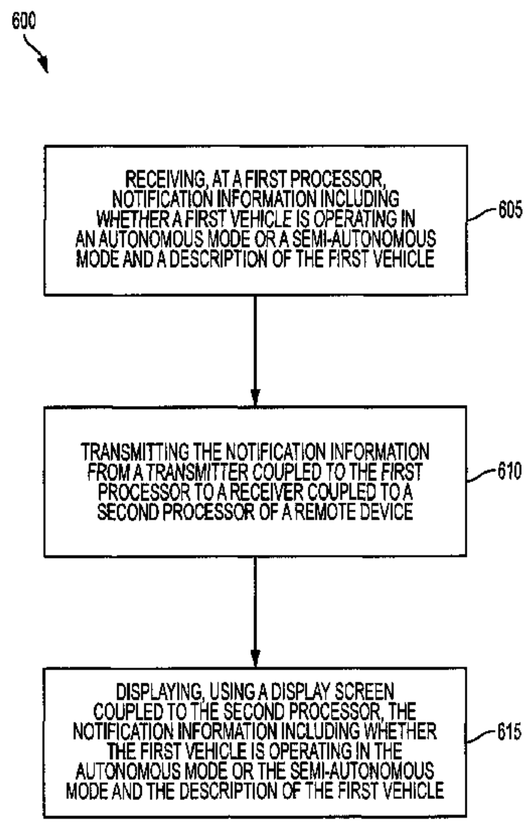
(57) **ABSTRACT**

A method for notifying a third party or a third party device (e.g., a mobile phone or a second vehicle) as to whether a first vehicle is operating in an autonomous mode or a semi-autonomous mode. The method includes receiving, at a first electronic control unit, notification information including whether the first vehicle is operating in the autonomous mode or the semi-autonomous mode and a description of or details about the first vehicle and transmitting from a transmitter of the first vehicle to a receiver of the third party device, the notification information. The method also includes displaying, using a display screen of the third party device, the notification information including whether the first vehicle is operating in the autonomous mode or the semi-autonomous mode and the description of or the details about the first vehicle.

17 Claims, 6 Drawing Sheets



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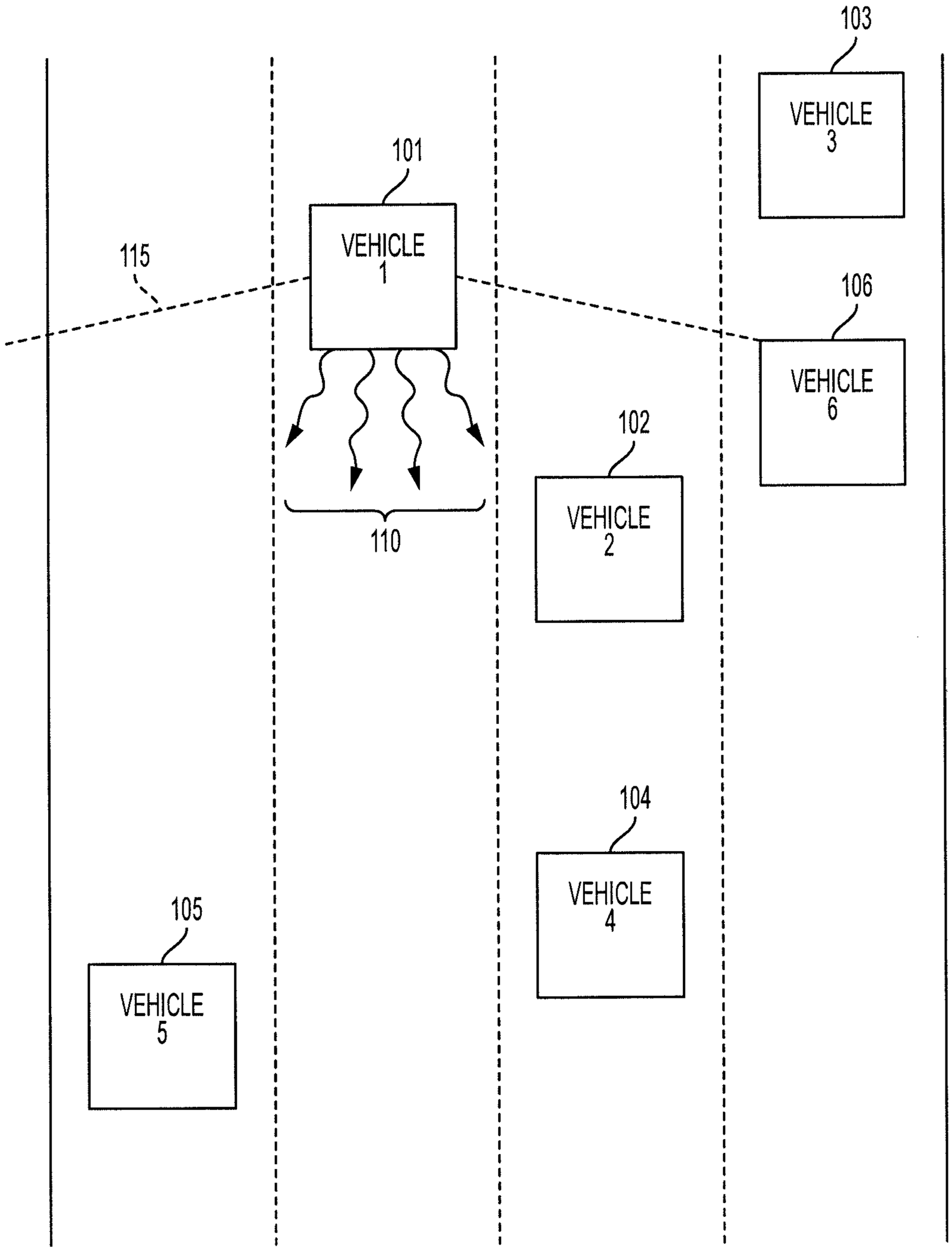
103
VEHICLE 3
101
VEHICLE 1
115
106
VEHICLE 6
102
VEHICLE 2
110
104
VEHICLE 4
105
VEHICLE 5

FIG. 1

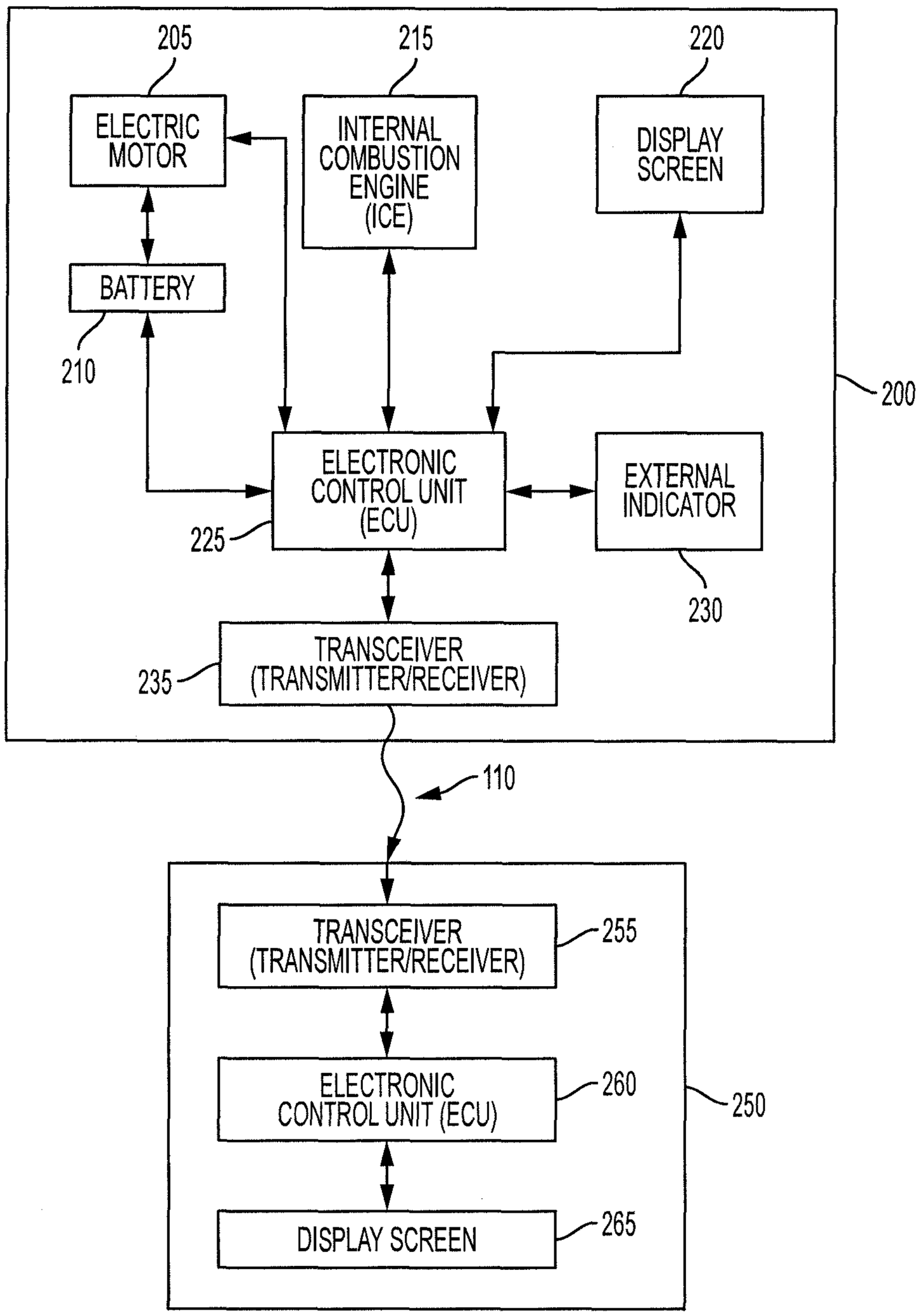
205
ELECTRIC MOTOR
BATTERY
210
215
INTERNAL COMBUSTION ENGINE (ICE)
220
DISPLAY SCREEN
200
ELECTRONIC CONTROL UNIT (ECU)
225
EXTERNAL INDICATOR
230
TRANSCEIVER (TRANSMITTER/RECEIVER)
235
110
TRANSCEIVER (TRANSMITTER/RECEIVER)
255
ELECTRONIC CONTROL UNIT (ECU)
260
250
DISPLAY SCREEN
265

FIG. 2

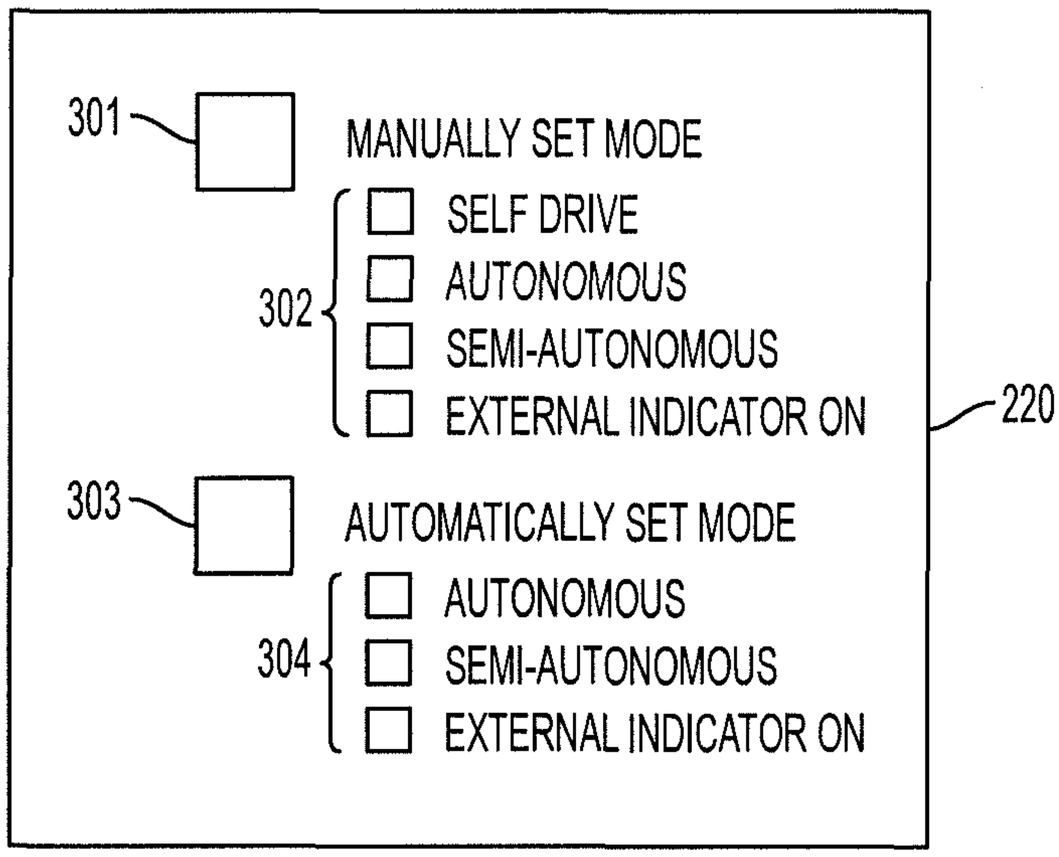
301
MANUALLY SET MODE
302
SELF DRIVE
AUTONOMOUS
SEMI-AUTONOMOUS
EXTERNAL INDICATOR ON
220
303
AUTOMATICALLY SET MODE
304
AUTONOMOUS
SEMI-AUTONOMOUS
EXTERNAL INDICATOR ON

FIG. 3

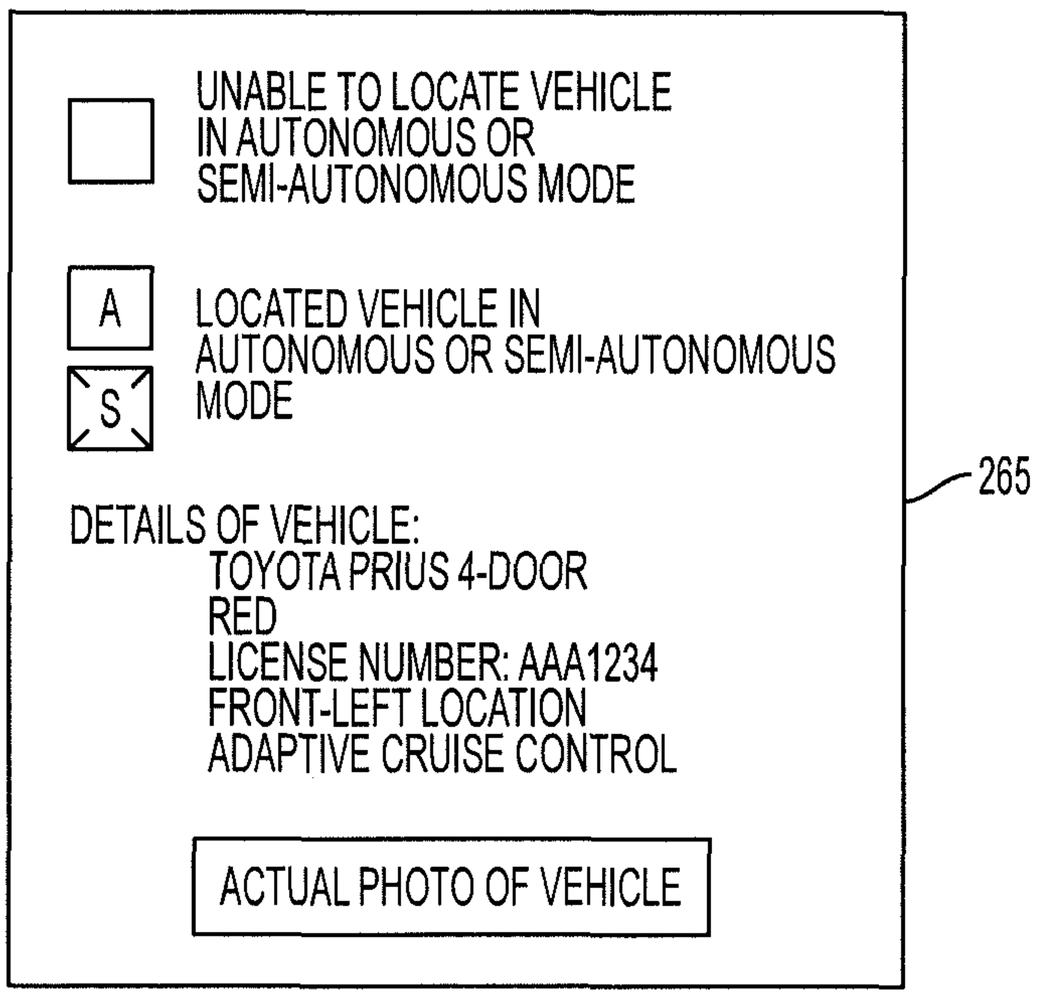
UNABLE TO LOCATE VEHICLE IN AUTONOMOUS OR SEMI-AUTONOMOUS MODE
A
S
LOCATED VEHICLE IN AUTONOMOUS OR SEMI-AUTONOMOUS MODE
265
DETAILS OF VEHICLE:
TOYOTA PRIUS 4-DOOR
RED
LICENSE NUMBER: AAA1234
FRONT-LEFT LOCATION
ADAPTIVE CRUISE CONTROL
ACTUAL PHOTO OF VEHICLE

FIG. 4

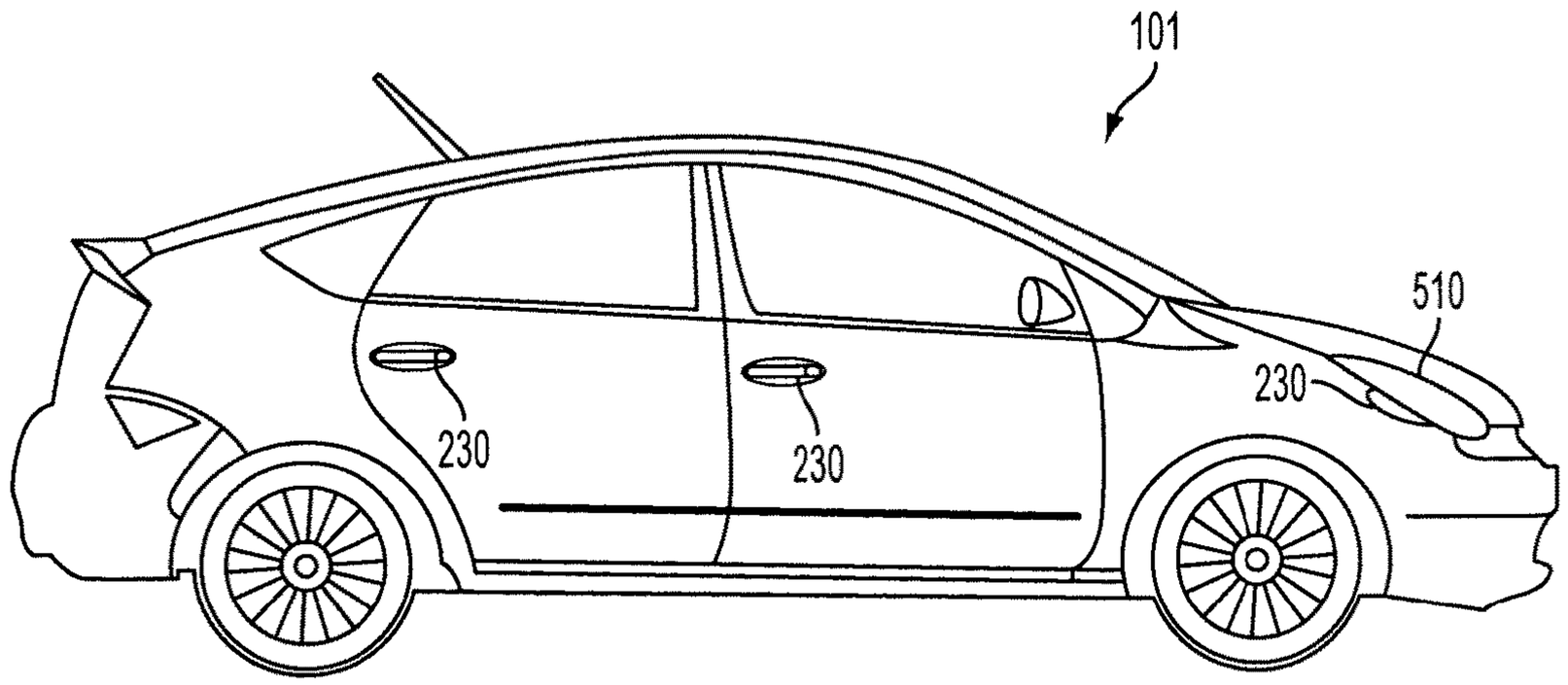
101
510
230
230
230

FIG. 5A

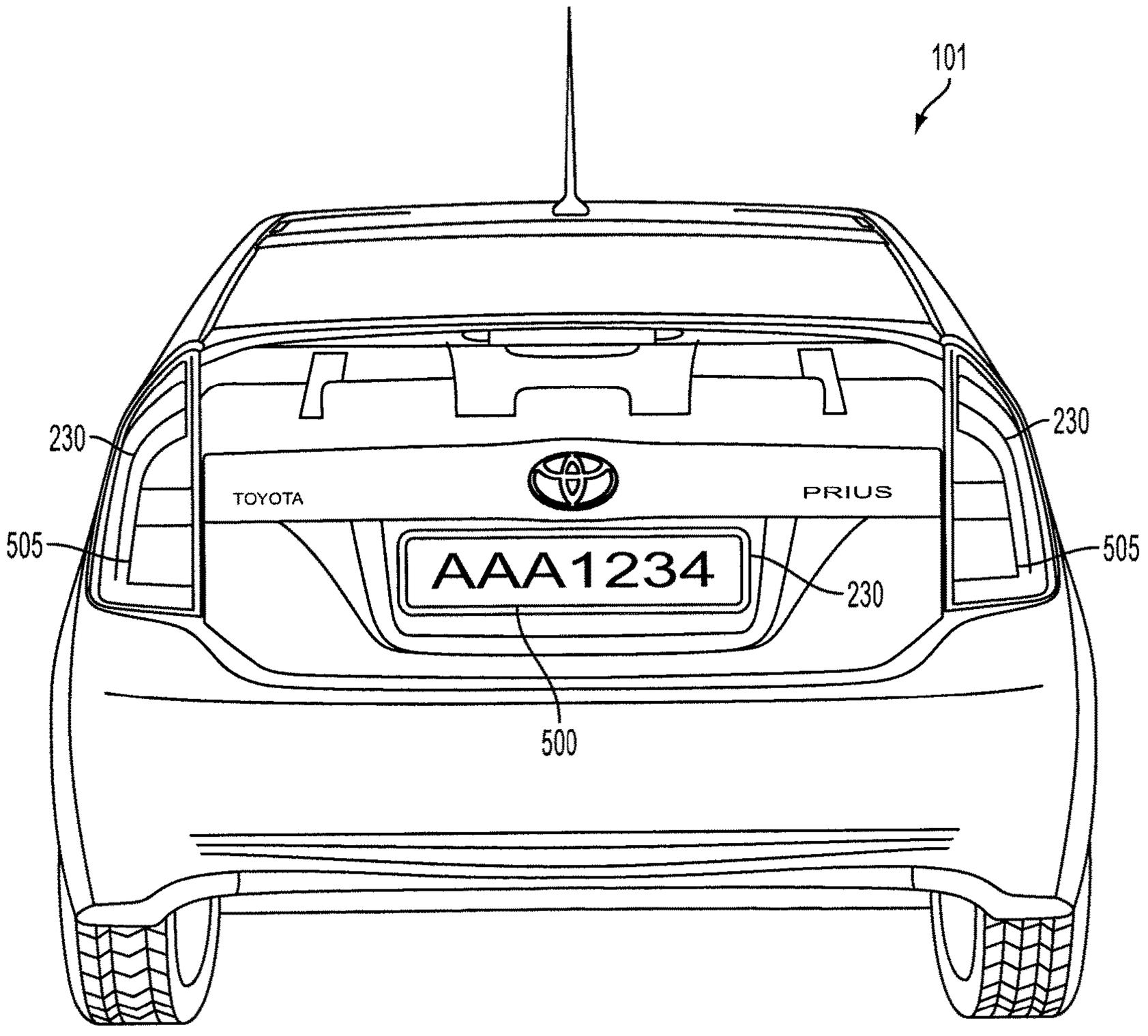
101
230
230
TOYOTA
PRIUS
505
505
AAA1234
230
500

FIG. 5B

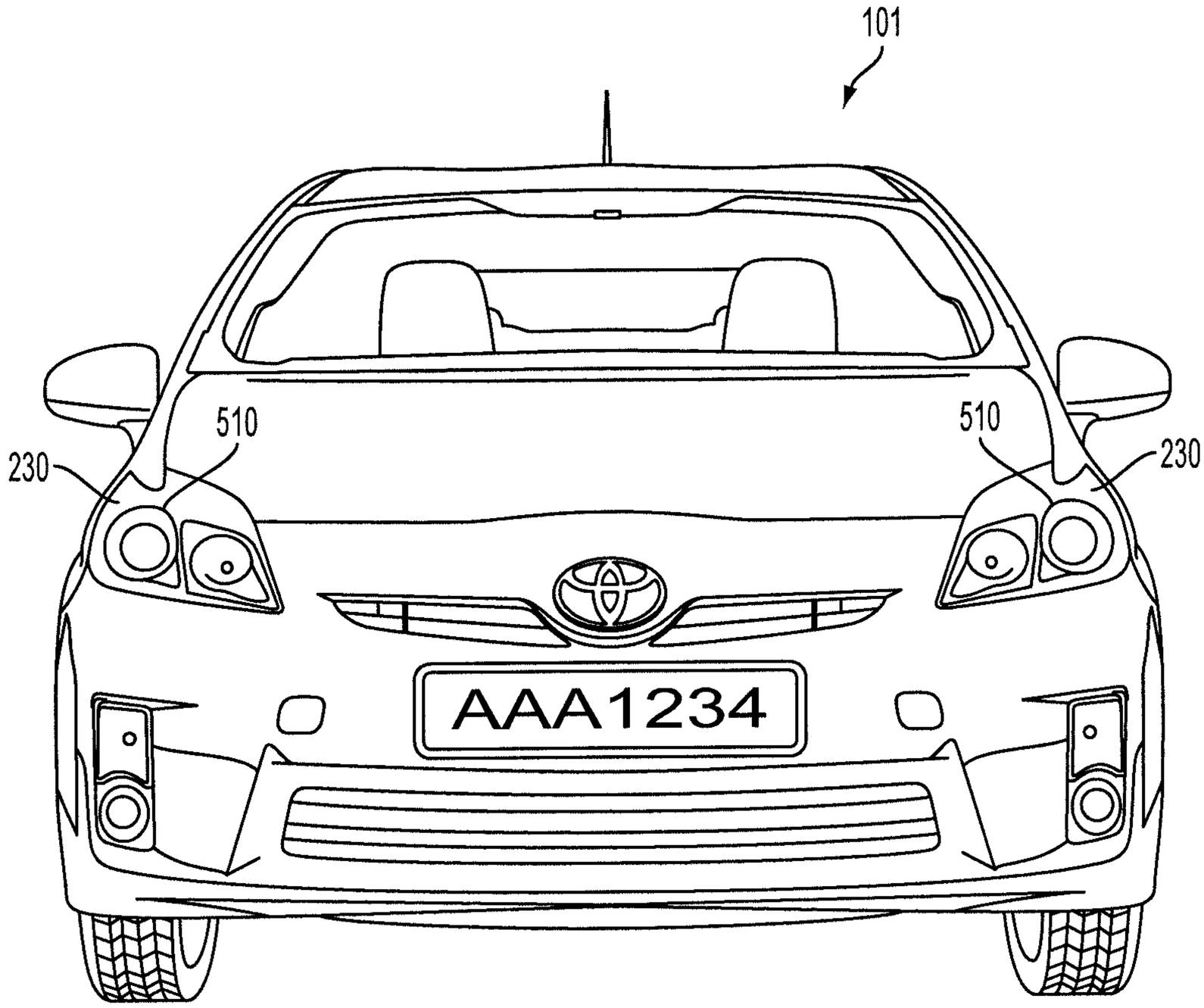

FIG. 5C

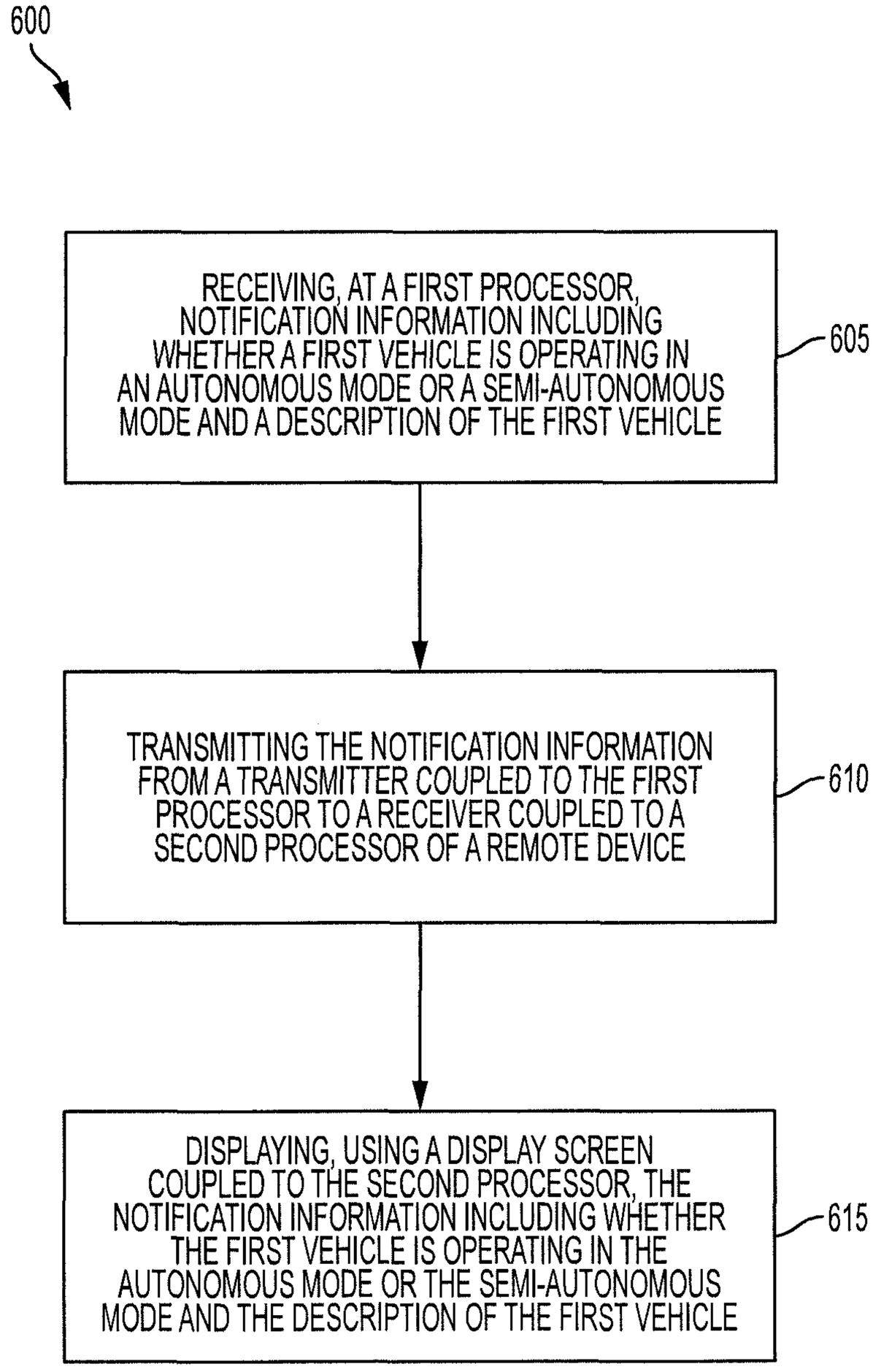
600
RECEIVING, AT A FIRST PROCESSOR, NOTIFICATION INFORMATION INCLUDING WHETHER A FIRST VEHICLE IS OPERATING IN AN AUTONOMOUS MODE OR A SEMI-AUTONOMOUS MODE AND A DESCRIPTION OF THE FIRST VEHICLE
605
TRANSMITTING THE NOTIFICATION INFORMATION FROM A TRANSMITTER COUPLED TO THE FIRST PROCESSOR TO A RECEIVER COUPLED TO A SECOND PROCESSOR OF A REMOTE DEVICE
610
DISPLAYING, USING A DISPLAY SCREEN COUPLED TO THE SECOND PROCESSOR, THE NOTIFICATION INFORMATION INCLUDING WHETHER THE FIRST VEHICLE IS OPERATING IN THE AUTONOMOUS MODE OR THE SEMI-AUTONOMOUS MODE AND THE DESCRIPTION OF THE FIRST VEHICLE
615

FIG. 6

EXTERNAL INDICATORS AND NOTIFICATIONS FOR VEHICLES WITH AUTONOMOUS CAPABILITIES

BACKGROUND

1. Field

The present invention relates to systems and methods that provide an external indicator on a vehicle and/or transmits notification information from the vehicle to one or more other vehicles or to one or more devices indicating that the vehicle is operating with semi-autonomous or autonomous features. The external indicator is visible from outside the vehicle to notify or show others that the vehicle is currently operating with semi-autonomous or autonomous features.

2. Description of the Related Art

Many automotive companies are currently developing semi-autonomous and autonomous vehicles. A semi-autonomous vehicle is a vehicle that has a driver but provides driver assistance such as automatic braking in the event of a potential accident. Semi-autonomous vehicles provide the driver with many advanced active driving and safety features. A semi-autonomous vehicle utilizes sensors and intelligent systems to augment what the driver is doing by enhancing the driver's ability to safely operate and control the vehicle. This is often thought of as a co-pilot where the sensors and intelligent systems are used to give the driver assistance when needed.

An autonomous vehicle, also known as a self-driving vehicle, is a vehicle that does not have a driver. Autonomous vehicles sense their surroundings and navigate without a driver or driver input. Advanced control systems and techniques such as radars, sensors, GPS and computer vision are implemented in autonomous vehicles to assist with self-driving maneuvers. These advanced control systems and techniques interpret sensory information to identify appropriate navigation paths and relevant signage as well as provide obstacle avoidance. Autonomous vehicles are capable of updating their maps in real-time allowing the vehicles to keep track of their position even when conditions change or when they approach or enter new environments. Semi-autonomous and autonomous vehicles are thought of as providing a safe, effective and efficient means of transportation.

Drivers of non-autonomous vehicles and third parties, however, might find it difficult to identify or determine which vehicles on the road are semi-autonomous or autonomous. For example, some autonomous vehicles have large cameras and equipment on top of their hoods, roofs and trunks. This equipment can be seen when close up but is difficult to see when far away. Also, semi-autonomous vehicles generally don't have cameras and equipment that are visible by other drivers or third parties.

Thus, there is a need for systems and methods that help drivers and third parties identify semi-autonomous and autonomous vehicles.

SUMMARY

A method for notifying a third party or a third party device (e.g., a mobile phone or a second vehicle) as to whether a first vehicle is operating in an autonomous mode or a semi-autonomous mode. The method includes receiving, at a first electronic control unit, notification information including whether the first vehicle is operating in the autonomous mode or the semi-autonomous mode and a description of or details about the first vehicle and transmitting from a transmitter of the first vehicle to a receiver of the third party device, the notification information. The method also includes displaying, using a display screen of the third party device, the notification information including whether the first vehicle is operating in the autonomous mode or the semi-autonomous mode and the description of or the details about the first vehicle.

A method for notifying a user as to whether a vehicle is operating in an autonomous mode or a semi-autonomous mode. The method includes receiving, at a processor, notification information including whether the vehicle is operating in the autonomous mode or the semi-autonomous mode and a description of the vehicle. The method also includes activating, using the processor, an external indicator of the vehicle when the vehicle is operating in the autonomous mode or the semi-autonomous mode. The method also includes transmitting the notification information from a transmitter coupled to the processor to a receiver of a remote device and displaying, using a display screen of the remote device, the notification information including whether the first vehicle is operating in the autonomous mode or the semi-autonomous mode and the description of the first vehicle.

BRIEF DESCRIPTION OF THE DRAWINGS

Other systems, methods, features, and advantages of the present invention will be or will become apparent to one with skill in the art upon examination of the following figures and detailed description. It is intended that all such additional systems, methods, features, and advantages be included within this description, be within the scope of the present invention, and be protected by the accompanying claims. Component parts shown in the drawings are not necessarily to scale, and may be exaggerated to better illustrate the important features of the present invention. In the drawings, like reference numerals designate like parts throughout the different views, wherein:

FIG. **1** illustrates a simplified map showing a number of vehicles travelling on a freeway and notification information being sent from one vehicle to one or more other vehicles or devices indicating that the vehicle is operating with semi-autonomous or autonomous features according to an embodiment of the present invention;

FIG. **2** illustrates a simplified block diagram of a system for transmitting the notification information of FIG. **1** and a system for receiving the notification information according to an embodiment of the present invention;

FIG. **3** illustrates an exemplary view of the display screen for allowing the driver to manually set the mode of the vehicle or automatically set the mode of the vehicle according to an embodiment of the present invention;

FIG. **4** illustrates an exemplary view of the display screen that displays the notification information providing the details of the autonomous or semi-autonomous vehicle to allow the driver of the other vehicle or a third party user of the device to locate the autonomous or semi-autonomous vehicle according to an embodiment of the present invention;

FIGS. **5**A-**5**C illustrate side, rear and front views of the vehicle showing various exemplary locations for the external indicator according to various embodiments of the present invention; and

FIG. **6** is an exemplary method for notifying a third party or a third party device whether a first vehicle is operating in

an autonomous mode or a semi-autonomous mode according to an embodiment of the present invention.

DETAILED DESCRIPTION

The systems, ECUs and methods described herein provide third party devices or third parties (e.g., police officers, administrators, government officials, traffic enforcers, other drivers, pedestrians, etc.) with a dynamic, real-time determination and notification as to whether a vehicle is currently operating with autonomous or semi-autonomous capabilities. That is, the system **200** or the vehicle **101** with autonomous or semi-autonomous capabilities is able to notify other vehicles, devices and individuals that it has these capabilities and is currently operating with these capabilities.

The vehicle **101** (or system **200**) provides this notification using the external indicator **230** and/or by transmitting the notification information **110** to other vehicles (e.g., vehicles **102** and **104**) or devices **250**. For example, if the vehicle **101** is driving through traffic using adaptive cruise control, the vehicle **101** may notify other drivers or third parties using the external indicator **230** and/or by transmitting the notification information **110** that it is using adaptive cruise control. The notification allows drivers (or third parties or devices) to easily and readily identify or determine which vehicles on the road are operating in a semi-autonomous or autonomous mode. The other drivers can then follow the vehicle **101** because the vehicle **101** may be a good vehicle to follow through traffic in order to advantageously provide a more predictable and smooth route through traffic, reduce commute or travel times, increase fuel economy and efficiency, reduce emissions and enhance safety. The vehicle **101**, operating in an autonomous or semi-autonomous mode, does not produce as many emissions as other vehicles due to the lack of sudden speed changes and better intelligence and guidance through traffic. The external indicator **230** may also encourage other drivers to drive their vehicles in a manner similar to the autonomous or semi-autonomous vehicle **101**, thereby reducing overall emissions.

The systems and methods transmit the notification information **110** from the first vehicle **101** to one or more devices or systems **250** (e.g., smart phones) and/or other vehicles (e.g., the second vehicle **102**). The notification information **110** may include data such as whether the vehicle **101** is operating in an autonomous or semi-autonomous mode, which features (e.g., adaptive cruise control) of the autonomous or semi-autonomous mode are active and/or inactive, whether the external indicator **230** of the vehicle **101** is on or off, a make, a model, a year, a color, a type of vehicle (e.g., number of doors, hatchback, SUV, sedan, coupe, truck, etc.), a license plate number and a photo of the vehicle **101**. By reviewing the notification information **110** and/or by observing the external indicator(s) **230**, the drivers of the other vehicles (or third party using a device) are able to quickly and easily determine whether the vehicle **101** is operating with autonomous or semi-autonomous capabilities.

An exemplary method is disclosed for notifying a third party or a third party device (e.g., a mobile phone or a second vehicle) as to whether a first vehicle is operating in an autonomous mode or a semi-autonomous mode. The method includes receiving, at a first electronic control unit, notification information including whether the first vehicle is operating in the autonomous mode or the semi-autonomous mode and a description of or details about the first vehicle and transmitting from a transmitter of the first vehicle to a receiver of the third party device, the notification information. The method also includes displaying, using a display screen of the third party device, the notification information including whether the first vehicle is operating in the autonomous mode or the semi-autonomous mode and the description of or the details about the first vehicle.

FIG. **1** illustrates a simplified map showing a number of vehicles (**101-106**) travelling on a freeway and notification information **110** being sent or transmitted from one vehicle (e.g., vehicle **1**) to one or more other vehicles (e.g., vehicles **2** and **4**) and/or one or more other devices. The notification information **110** can be sent or transmitted using radio frequency (RF), short wave communications, wireless fidelity (Wi-Fi), Bluetooth® or cellular communications, signals or waves. The notification information **110** indicates to the other vehicles (or devices) that the vehicle **101** is currently operating with semi-autonomous or autonomous features. Generally, the notification information **110** is sent or transmitted to vehicles that are behind, to the sides and/or within a predefined range (preferably 25-100 meter range) of the vehicle **101**. The notification information **110** can also be sent or transmitted to vehicles and/or devices that are travelling or moving the same or similar direction. In one embodiment, the vehicle **101** may transmit the notification information **110** in rear and side directions **115** and only towards vehicles in these directions **115** and up to a 100 meter range (e.g., vehicles **102**, **104** and **106**) will receive the notification information **110**. The vehicles to the front (e.g., vehicle **103**) and the vehicles further away (e.g., vehicle **105**, which is greater than 100 meters away) will not receive the notification information **110**.

The notification information **110** is useful in communicating to other drivers that the vehicle **101** is currently operating in an autonomous or semi-autonomous mode and that the vehicle **101** may be a good vehicle to follow through traffic in order to provide a more predictable and smooth route through traffic, reduce commute or travel times, reduce emissions and/or enhance safety. The vehicles **101-106** can be conventional internal combustion engine vehicles, electric vehicles (EVs), hybrid vehicles (HVs), plug-in hybrid vehicles (PHVs), fuel cell vehicles (FCVs), fuel cell electric vehicles (FCEVs) and other similar vehicles.

FIG. **2** illustrates a simplified block diagram of a system **200** for transmitting the notification information **110** of FIG. **1** and a system **250** for receiving the notification information **110**. As an example, the system **200** is generally on the autonomous or semi-autonomous vehicles (e.g., vehicle **101**) and the system **250** is generally on the non-autonomous vehicles (e.g., vehicles **102-106**).

The system **200** may include an electric motor **205**, a battery **210** (or batteries), an internal combustion engine (ICE) **215**, a display screen **220**, an electronic control unit (ECU) **225**, an external indicator **230** and a transceiver **235** (transmitter and/or receiver). A fuel cell can be used in place of the internal combustion engine **215**. The term "engine" will be used in this disclosure but one skilled in the art will know how to utilize a fuel cell in place of the engine **215**. The ECU **225** can be a processor with a memory. The display screen **220** can be a touch screen or allow for input using an input device.

The external indicator **230** may be a light or an indication that is external (e.g., on an external portion or surface) to the vehicle **101** indicating that the vehicle **101** is currently operating in an autonomous or semi-autonomous mode. The external indicator **230** allows third parties (e.g., people, police officers, administrators, government officials, traffic enforcers, other drivers, pedestrians, etc.) or third party

devices (e.g., mobile phones or devices) to be notified as to whether the vehicle **101** is currently operating in an autonomous or semi-autonomous mode. The external indicator **230** can be LED lights that when illuminated indicate an autonomous or semi-autonomous operation of the vehicle **101**. The external indicator **230** can also take the form of external badges, emblems, charge doors, etc. Based on whether the vehicle **101** is operating in the autonomous or semi-autonomous mode, the ECU **225** can send a signal to turn on and turn off the external indicator(s) **230**. In one embodiment, the user cannot override the ECU **225** in order to turn on the external indicator **230** when the vehicle **101** is not operating in the autonomous or semi-autonomous mode. This prevents the driver or user from being able to indicate the autonomous or semi-autonomous mode without actually being in one of these modes.

The system **250** may include a transceiver **255** (transmitter and/or receiver), an electronic control unit (ECU) **260** and a display screen **265**. The ECU **260** can be a processor with a memory. The display screen **265** can be a touch screen or allow for input using an input device. The system **250** can be a remote or portable device such as a cell phone, smart phone or tablet device having an antenna for receiving and transmitting signals, a transceiver, a processor and/or a display screen. This will allow individuals and other users the ability to receive the notifications on their smart phones or other devices without being tied to a particular vehicle. The system **250** is generally remote from the vehicle **101**. The system **250** can also be integrated into another vehicle (e.g., a second vehicle **102**) or part of a remote or portable device. The systems **200** and **250** can also be configured to allow two way voice and data communications, chat sessions, phone calls, text messaging and other interaction and support. For example, the driver of vehicle **102** can use system **250** to communicate with and contact the driver of vehicle **101** using system **200**.

The ECUs **225** and **260** may each include a processor and a memory that stores the notification information **110**. For example, the notification information **110** may include data such as whether the vehicle **101** is operating in an autonomous or semi-autonomous mode, which features (e.g., adaptive cruise control) of the autonomous or semi-autonomous mode are active and/or inactive, whether the external indicator **230** of the vehicle **101** is on or off, a make, a model, a year, a color, a type of vehicle (e.g., number of doors, hatchback, SUV, sedan, coupe, truck, etc.), a license plate number and a photo of the vehicle **101**. This data or information can be input by the driver or a passenger using the display screen **220**, can be pre-stored in the memory of the ECU **225** and/or can be determined by the ECU **225**. For example, the driver can load or store a recent photo and the license plate number of the vehicle **101** in the memory of the ECU **225**. The make, model, year, color and type of vehicle can be pre-stored in the memory of the ECU **225**. Also, the ECU **225** can determine whether the vehicle **101** is operating in an autonomous or semi-autonomous mode, which features (e.g., adaptive cruise control) of the autonomous or semi-autonomous mode are active and/or inactive and whether the external indicator **230** of the vehicle **101** is on or off.

The ECU **225** may determine or obtain the notification information **110** or retrieve the notification information **110** from its memory and transmit it via the transceiver **235** to the other vehicles (e.g., vehicles **102** and **104**) or devices **250** in the vicinity.

FIG. **3** illustrates an exemplary view of the display screen **220** for allowing the driver to manually set the mode of the vehicle **101** or automatically set the mode of the vehicle **101**. Using the touch display screen **220**, the driver can select whether the mode of the vehicle **101** should be set manually or automatically. The driver can touch one of the large squares **301** or **303** to make the selection. If the manually set mode **301** is selected, the driver will also need to select one or more of the small squares **302** to complete the set up. If the automatically set mode **303** is selected, the ECU **225** may make a selection based on, for example, whether there is a driver in the driver seat. If no driver is in the driver seat, the ECU **225** will select the autonomous mode. If there is a driver in the driver seat, the ECU **225** will select the semi-autonomous mode. Also, the ECU **225** may automatically turn on the external indicator **230** if the vehicle **101** is in the autonomous or semi-autonomous mode or only when the vehicle **101** is in the autonomous mode.

FIG. **4** illustrates an exemplary view of the display screen **265** that displays the notification information **110** providing the details of the autonomous or semi-autonomous vehicle **101** to allow the driver of the other vehicle **102** to locate the autonomous or semi-autonomous vehicle **101**. The transceiver **255** receives the notification information **110** from the transceiver **235**. The ECU **260** provides the notification information **110** to the display screen **265** for display. The display screen **265** allows the driver of the other vehicle **102** to view the notification information **110** and determine the location of the autonomous or semi-autonomous vehicle **101**. The transceiver **255** may also determine the direction of the notification information **110** (e.g., the signal) and provide this direction information (e.g., front-left location) to the ECU **260** for display on the display screen **265**.

FIGS. **5**A-**5**C illustrate side, rear and front views of the vehicle **101** showing various exemplary locations for the external indicator **230**. FIG. **5**A shows the external indicator **230** positioned on or adjacent to the door handles of the vehicle **101**. FIG. **5**B shows the external indicator **230** positioned around or adjacent to a license plate **500** and around or adjacent to the rear taillights **505**. FIG. **5**C shows the external indicator **230** positioned around or adjacent to the front headlights **510**. The external indicator **230** can also be a green color or other color or shape designating an autonomous or semi-autonomous mode. This advantageously allows the external indicator **230** to be distinguishable from the white, red and yellow lights traditionally found on vehicles. The external indicator **230** is preferably around or adjacent to another light (e.g., the front headlights or the rear taillights) in order to minimize any distraction to other drivers. The external indicator **230** being around or adjacent to the license plate **500** provides a predictable and easy location for the third party to look in order to obtain this autonomous or semi-autonomous mode information.

One or more external indicators **230** (e.g., lights) can be located on the outside of the vehicle **101**. The external indicator **230** is positioned to be easily viewed by other drivers. In some embodiments, the external indicator **230** is not viewable when the driver is sitting in the driver seat of the vehicle **101**. When the ECU **225** determines that the vehicle **101** is operating with autonomous or semi-autonomous features, the ECU **225** automatically controls the illumination of the external indicator **230**. In some embodiments, the driver of the vehicle **101** cannot control the illumination of the external indicator **230** but rather the illumination (i.e., turning on and off) of the external indicator **230** is controlled solely by the ECU **225**. This prevents the driver from inadvertently switching on the external indicator **230** when the vehicle **101** is not operating with autonomous or semi-autonomous features.

FIG. **6** is an exemplary method **600** for notifying a third party or a third party device whether a first vehicle is operating in an autonomous mode or a semi-autonomous mode according to an embodiment of the present invention. The method includes receiving, at a first processor, notification information including whether a first vehicle is operating in the autonomous mode or the semi-autonomous mode and a description of the first vehicle (step **605**). The method also includes transmitting the notification information from a transmitter coupled to the first processor to a receiver coupled to a second processor of a remote device (step **610**). The method also includes displaying, using a display screen coupled to the second processor, the notification information including whether the first vehicle is operating in the autonomous mode or the semi-autonomous mode and the description of the first vehicle (step **615**).

Exemplary embodiments of the invention have been disclosed in an illustrative style. Accordingly, the terminology employed throughout should be read in a non-limiting manner. Although minor modifications to the teachings herein will occur to those well versed in the art, it shall be understood that what is intended to be circumscribed within the scope of the patent warranted hereon are all such embodiments that reasonably fall within the scope of the advancement to the art hereby contributed, and that that scope shall not be restricted, except in light of the appended claims and their equivalents.

What is claimed is:

1. A method for notifying a user outside of a vehicle as to whether the vehicle is operating in an autonomous mode or a semi-autonomous mode, the method comprising:

activating, using a processor of the vehicle, an external indicator of the vehicle when the vehicle is operating in the autonomous mode or the semi-autonomous mode;

determining, by the processor of the vehicle, notification information including whether the vehicle is operating in the autonomous mode or the semi-autonomous mode, an identification of at least one active or inactive feature of the autonomous mode or the semi-autonomous mode, whether the external indicator of the vehicle is activated, and a description of or details about the vehicle;

transmitting the notification information from a transmitter coupled to the processor to a receiver of a remote device, the remote device being a cell phone, a smartphone or a tablet device; and

displaying, using a display screen of the remote device, the notification information including whether the vehicle is operating in the autonomous mode or the semi-autonomous mode, the identification of the at least one active or inactive feature of the autonomous mode or the semi-autonomous mode, whether the external indicator of the vehicle is activated, and the description of or the details about the vehicle, the description of or the details about the vehicle including a make, a model, a year, a color, a type of vehicle, a license plate number or a photo of the vehicle, such that the user is able to identify and locate the vehicle based on the description of or the details about the vehicle.

2. The method of claim **1**, wherein the notification information further includes a location of the vehicle.

3. The method of claim **1**, wherein the external indicator is positioned on an external portion or surface of the vehicle.

4. The method of claim **1**, wherein the external indicator is a LED light that when illuminated indicates the autonomous mode or the semi-autonomous mode.

5. The method of claim **1**, further comprising a vehicle display screen coupled to the processor, the vehicle display screen allowing a user in the vehicle to manually or automatically set the autonomous mode or the semi-autonomous mode.

6. The method of claim **1**, wherein the processor automatically activates the external indicator of the vehicle when the vehicle is operating in the autonomous mode or the semi-autonomous mode.

7. The method of claim **1**, wherein the processor prevents a user in the vehicle from activating the external indicator of the vehicle when the vehicle is not operating in the autonomous mode or the semi-autonomous mode.

8. The method of claim **1**, wherein the receiver of the remote device determines a direction of the notification information and provides the direction to the display screen of the remote device for display.

9. A method for notifying a second vehicle as to whether a first vehicle is operating in an autonomous mode or a semi-autonomous mode, the method comprising:

receiving, at an electronic control unit of the first vehicle, notification information including whether the first vehicle is operating in the autonomous mode or the semi-autonomous mode, an identification of at least one inactive feature of the autonomous mode or the semi-autonomous mode, and a description of or details about the first vehicle;

transmitting the notification information from a transmitter of the first vehicle to a receiver of the second vehicle; and

displaying, using a display screen of a mobile computing device in the second vehicle, the notification information including whether the first vehicle is operating in the autonomous mode or the semi-autonomous mode, the identification of the at least one active or inactive feature of the autonomous mode or the semi-autonomous mode, and the description of or the details about the first vehicle, the description of or the details about the first vehicle including a make, a model, a year, a color, a type of vehicle, a license plate number or a photo of the first vehicle, such that a user in the second vehicle is able to identify and locate the first vehicle based on the description of or the details about the first vehicle.

10. The method of claim **9**, further comprising activating, using the electronic control unit, an external indicator when the first vehicle is operating in the autonomous mode or the semi-autonomous mode.

11. The method of claim **10**, wherein the external indicator is positioned on an external portion or surface of the first vehicle.

12. The method of claim **10**, wherein the external indicator is a LED light that when illuminated indicates the autonomous mode or the semi-autonomous mode.

13. The method of claim **10**, wherein the electronic control unit automatically activates the external indicator of the first vehicle when the first vehicle is operating in the autonomous mode or the semi-autonomous mode.

14. The method of claim **10**, wherein the electronic control unit prevents a user in the first vehicle from activating the external indicator of the first vehicle when the first vehicle is not operating in the autonomous mode or the semi-autonomous mode.

15. The method of claim **10**, wherein the notification information further includes whether the external indicator of the first vehicle is on or off.

16. The method of claim 9, further comprising a vehicle display screen coupled to the electronic control unit, the vehicle display screen allowing a user in the first vehicle to manually or automatically set the autonomous mode or the semi-autonomous mode.

17. The method of claim 9, wherein the receiver of the second vehicle determines a direction of the notification information or the first vehicle and provides the direction to the display screen of the mobile computing device in the second vehicle for display.

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